

**MUNICIPAL STRUCTURE INSPECTION FORM**

**BRIDGE**

Site No.: 10

REPAIR AND REHABILITATION REQUIRED		Priority			Estimated Cost
Element	Repair and Rehabilitation Required	6 – 10 Years	1 - 5 Years	< 1 year	
Approaches	Replace end treatments with code compliant end treatment, replace damaged sections of guiderail			X	\$ 24,000.00
<b>Total Cost</b>					<b>\$ 24,000.00</b>

ASSOCIATED WORK	Comments	Estimated Cost
Approaches		
Detours		
Traffic Control		
Utilities		
Right of Way		
Environmental Study		
Other		
Contingencies		
<b>Total Cost</b>		<b>\$</b>

JUSTIFICATION

MUNICIPAL STRUCTURE INSPECTION FORM

BRIDGE

SITE PHOTOGRAPHS

Site No.: 10



Photo 1 Structure from north approach



Photo 2 Structure from south approach

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Photo 3 North approach from centre of structure



Photo 4 South approach from centre of structure

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Photo 5 East elevation



Photo 6 West elevation

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Photo 7 Wide longitudinal and transverse cracks noted on wearing surface



Photo 8 Damage observed on steel beam at southwest corner

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Photo 9 Narrow crack with efflorescence on north deck soffit



Photo 10 Typical deck soffit with previous concrete repairs

MUNICIPAL STRUCTURE INSPECTION FORM

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Photo 11 Typical northeast wingwall



Photo 12 Typical north abutment wall

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SITE PHOTOGRAPHS

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Photo 13 Graffiti on south abutment wall



### Structure Condition Summary Form

**Structure Name** Line 3 North Road Bridge  
**Structure Number** 12  
**Date of Inspection** June 03, 2022  
**Project No.** 22035  
**Consultant** HP Engineering Inc.

Element Group	Element Name	Unit (Qty.)	Unit Price (MTO)	Total Element Quantity	Element Qty. in Excellent Condition (1.00)	Element Quantity in Good Condition (0.75)	Element Quantity in Fair Condition (0.4)	Element Quantity in Poor Condition (0)	Total Replacement Value (TRV)	Current Element Value (CEV)	Element Condition Index	Performance Deficiency	Maintenance Need
Abutment	Abutment Walls	Sq.m	900.00	95.47	0.00	95.47	0.00	0.00	85923	64442	75	00	00
Approaches	Wearing Surface	Sq.m	6.00	42.90	0.00	25.90	15.00	2.00	257	153	59	00	02, 12
Barriers	Posts - Timber	Each	50.00	22.00	0.00	22.00	0.00	0.00	1100	825	75	00	00
	Railing Systems	m	200.00	33.00	0.00	32.00	0.50	0.50	6600	4840	73	08	00
Beams / Main	Girders -Steel	Sq.m	420.00	90.63	0.00	90.63	0.00	0.00	38065	28548	75	00	00
	Deck Top - Thin Slab	Sq.m	120.00	138.60	0.00	138.60	0.00	0.00	16632	12474	75	00	00
Decks	Soffit - Thin Slab	Sq.m	120.00	145.20	0.00	145.20	0.00	0.00	17424	13068	75	00	00
	Wearing Surface	Sq.m	25.00	117.98	0.00	111.98	5.00	1.00	2950	2150	73	00	12
Sidewalks/ Curbs	Curbs	Sq.m	40.00	23.10	0.00	23.10	0.00	0.00	924	693	75	00	00

169875 127193

**Bridge Condition Index (BCI)**

75

$I_t$

0

Importance Factor for Traffic

$I_c$

0

Importance Factor for Economic Impacts

$I_w$

0

Importance Factor for Bridge Width

$I_p$

0

Importance Factor for Bridge Profile or Alignment

**Bridge Sufficiency Index (BSI)**

75

**MUNICIPAL STRUCTURE INSPECTION FORM**

**BRIDGE**

**Site No.: 12**

INVENTORY DATA:			
Structure Name	<u>Line 3 North Road Bridge</u>		
Main Hwy/Road #	_____ On <input checked="" type="checkbox"/> Under <input type="checkbox"/>	Crossing Type:	Navigable Water <input type="checkbox"/> Non- Navigable Water <input checked="" type="checkbox"/> Rail <input type="checkbox"/> Road <input checked="" type="checkbox"/> Ped <input type="checkbox"/> Other <input type="checkbox"/>
Road Name:	<u>Line 3 North Road</u>		
Structure Location	<u>250m North of Highway 17, Lot 17, Con 12 Bonfield Ontario over Kaibuskong River</u>		
Latitude	<u>46° 16' 19" N</u>	Longitude	<u>79° 8' 15" W</u>
Owner(s)	<u>Township of Bonfield</u>	Heritage Designation	Not Cons. <input checked="" type="checkbox"/> Cons./Not App. <input type="checkbox"/> List/Not Desig. <input type="checkbox"/> Desig./not List <input type="checkbox"/> Desig. & List <input type="checkbox"/>
MTO Region	<u>Northeastern</u>	Road Class:	Freeway <input type="checkbox"/> Arterial <input type="checkbox"/> Collector <input type="checkbox"/> Local <input checked="" type="checkbox"/>
MTO District	<u>Sudbury</u>	Posted Speed	<u>-</u> No. of Lanes <u>1</u>
Old County	<u>Nipissing</u>	AADT	<u>-</u> % Trucks <u>-</u>
Geographic Twp.	<u>Bonfield</u>	Special Routes	Transit <input type="checkbox"/> Truck <input checked="" type="checkbox"/> School <input checked="" type="checkbox"/> Bicycle <input checked="" type="checkbox"/>
Structure Type	<u>Concrete Slab on Steel Girders</u>	Detour Length Around Structure	_____ (km)
Total Deck Length	<u>16.5</u> (m)	Fill on Structure	_____ (m)
Overall Str. Width	<u>8.4</u> (m)	Skew Angle	_____ (Degrees)
Total Deck Area	<u>138.6</u> (m <sup>2</sup> )	Direction of Structure	<u>N-S</u>
Roadway Width	<u>7.15</u> (m)	No. of Spans	<u>1</u> (m)
Span Lengths	<u>16.5</u> (m)		

HISTORICAL DATA			
Year Built	_____	Last Biennial Inspection	<u>August 6, 2020</u>
Current Load Limit	_____ (tonnes)	Last Bridge Master Inspection	_____
Load Limit By-Law #	_____	Last Evaluation	_____
By-Law Expiry Date	_____	Last Underwater Inspection	_____
Min. Vertical Clearance	_____ (m)	Last Condition Survey	_____
<b>Rehabilitation History: (Date / Description)</b>			

**MUNICIPAL STRUCTURE INSPECTION FORM**

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FIELD INSPECTION INFORMATION	
Date of Inspection:	<u>June 03, 2022</u>
Inspector:	<u>Tashi Dwivedi, P.Eng., HP Engineering</u>
Others in Party:	<u>Nicholas Brown, HP Engineering</u>
Equipment Used:	<u>Digital camera, measuring tape, hammer</u>
Weather:	<u>Overcast</u>
Temperature:	<u>22 °C</u>

ADDITIONAL INVESTIGATION REQUIRED	Priority			Estimated Cost
	None	Normal	Urgent	
Detailed Deck Condition Survey:	X			\$
Bridge Rehabilitation / Replacement Study:			X	\$ 5,000.00
Detailed Coating Condition Survey:	X			\$
Underwater Investigation:	X			\$
Fatigue Investigation:	X			\$
Seismic Investigation:	X			\$
Structural Evaluation:	X			\$
Load Posting - Estimated Load			Total Cost	\$ <b>5,000.00</b>

Special Notes:  
 Rehabilitation / replacement study is for barrier only.

Structure is generally in good condition. Code compliant end treatment should be installed. Adequacy of deck barrier should be verified. Washout noted in approach wearing surface at northeast and northwest corners.

Next Detailed Inspection:	June 2024
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**Suspected Performance Deficiencies**

- |  |  |                              |
|--|--|------------------------------|
| 00 None  | 06 Bearing not uniformly loaded/unstable | 12 Slippery surfaces         |
| 01 Load carrying capacity                          | 07 Jammed expansion joint                | 13 Flooding/channel blockage |
| 02 Excessive deformations (deflections & rotation) | 08 Pedestrian/vehicular hazard           | 14 Undermining of foundation |
| 03 Continuing settlement                           | 09 Rough riding surface                  | 15 Unstable embankments      |
| 04 Continuing movements                            | 10 Surface ponding                       | 16 Other                     |
| 05 Seized bearings                                 | 11 Deck drainage                         |                              |

**Maintenance Needs**

- |                                      |                               |  |
|--------------------------------------|-------------------------------|--|
| 01 Lift and swing bridge maintenance | 07 Repair of structural steel | 13 Erosion control at bridges            |
| 02 Bridge cleaning                   | 08 Repair of bridge concrete  | 14 Concrete sealing                      |
| 03 Bridge handrail maintenance       | 09 Repair of bridge timber    | 15 Rout and seal                         |
| 04 Painting steel bridge structures  | 10 Bailey bridges maintenance | 16 Bridge deck drainage                  |
| 05 Bridge deck joint repair          | 11 Animal/pest control        | 17 Scaling (Loose concrete or ACR steel) |
| 06 Bridge bearing maintenance        | 12 Bridge surface repair      | 18 Other                                 |

**MUNICIPAL STRUCTURE INSPECTION FORM**

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ELEMENT DATA						
<b>Element Group:</b>	Approaches			<b>Length:</b>	10.1 m	
<b>Element Name:</b>	Barrier			<b>Width:</b>	-	
<b>Location:</b>	NE, NW, SE & SW of Structure			<b>Height:</b>	-	
<b>Material:</b>	Steel and Timber			<b>Count:</b>	2	
<b>Element Type:</b>	Steel Flex Beam on Timber Posts			<b>Total Quantity:</b>	20.2 m	
<b>Environment:</b>	Severe			<b>Not Inspected:</b>	<input type="checkbox"/>	
<b>Protection System</b>	None				<b>Performance Deficiencies</b>	<b>Maintenance Needs</b>
<b>Units</b>	<b>Excellent</b>	<b>Good</b>	<b>Fair</b>	<b>Poor</b>		
m	-	6.2	10	4	08	-
<b>Comments:</b>	Multiple rotated and loose spacers observed on approach barrier. Section of flex beam on northeast barrier not connected to post due to bend in flex beam. Buried end treatments are not code compliant. Code compliant end treatments should be installed. Rating is based on condition only.					
None	<input type="checkbox"/>	1 – 5 years	<input type="checkbox"/>	< 1 year	<input checked="" type="checkbox"/>	Urgent <input type="checkbox"/>

<b>Element Group:</b>	Approaches			<b>Length:</b>	6 m	
<b>Element Name:</b>	Wearing Surface			<b>Width:</b>	7.15 m	
<b>Location:</b>	North & South of Structure			<b>Height:</b>	-	
<b>Material:</b>	Gravel			<b>Count:</b>	2	
<b>Element Type:</b>	Wearing Surface			<b>Total Quantity:</b>	42.9 m <sup>2</sup>	
<b>Environment:</b>	Severe			<b>Not Inspected:</b>	<input type="checkbox"/>	
<b>Protection System</b>	None				<b>Performance Deficiencies</b>	<b>Maintenance Needs</b>
<b>Units</b>	<b>Excellent</b>	<b>Good</b>	<b>Fair</b>	<b>Poor</b>		
m <sup>2</sup>	-	25.9	15	2	-	02, 12
<b>Comments:</b>	Generally in fair condition with tire rutting on south approach near the deck. Some debris accumulation noted on the deck. Washout noted at northeast and northwest corner. Depression observed in wearing surface at south approach.					
None	<input checked="" type="checkbox"/>	1 – 5 years	<input type="checkbox"/>	< 1 year	<input type="checkbox"/>	Urgent <input type="checkbox"/>

<b>Element Group:</b>	Accessories			<b>Length:</b>	-	
<b>Element Name:</b>	Hazard Signs, Narrow Lane Signs			<b>Width:</b>	-	
<b>Location:</b>	NE, NW, SE & SW of Structure			<b>Height:</b>	-	
<b>Material:</b>	Steel			<b>Count:</b>	6	
<b>Element Type:</b>	Steel Hazard Signs, Narrow Lane Signs			<b>Total Quantity:</b>	6	
<b>Environment:</b>	Severe			<b>Not Inspected:</b>	<input type="checkbox"/>	
<b>Protection System</b>	Hot Dip Galvanizing				<b>Performance Deficiencies</b>	<b>Maintenance Needs</b>
<b>Units</b>	<b>Excellent</b>	<b>Good</b>	<b>Fair</b>	<b>Poor</b>		
each	-	5	1	-	-	-
<b>Comments:</b>	Generally in good condition with some abrasions noted on signs. Northeast hazardous sign is leaning.					
None	<input checked="" type="checkbox"/>	1 – 5 years	<input type="checkbox"/>	< 1 year	<input type="checkbox"/>	Urgent <input type="checkbox"/>

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ELEMENT DATA						
<b>Element Group:</b>	Barrier			<b>Length:</b>	16.5 m	
<b>Element Name:</b>	Railing System			<b>Width:</b>	-	
<b>Location:</b>	East & West Sides of Structure			<b>Height:</b>	-	
<b>Material:</b>	Steel			<b>Count:</b>	2	
<b>Element Type:</b>	Steel Flex Beam on Wood Posts			<b>Total Quantity:</b>	33 m	
<b>Environment:</b>	Severe			<b>Not Inspected:</b>	<input type="checkbox"/>	
<b>Protection System</b>	None				<b>Performance Deficiencies</b>	<b>Maintenance Needs</b>
<b>Units</b>	<b>Excellent</b>	<b>Good</b>	<b>Fair</b>	<b>Poor</b>		
m	-	32	0.5	0.5	08	-
<b>Comments:</b>	Vehicle damage observed on barrier at southeast and northwest corners of deck. Multiple rotated and loose spacers on deck barrier. Adequacy of deck barrier should be verified.					
	None <input type="checkbox"/>	1 – 5 years <input type="checkbox"/>	< 1 year <input checked="" type="checkbox"/>	Urgent <input type="checkbox"/>		

<b>Element Group:</b>	Barriers			<b>Length:</b>	-	
<b>Element Name:</b>	Posts			<b>Width:</b>	-	
<b>Location:</b>	East & West Sides of Structure			<b>Height:</b>	-	
<b>Material:</b>	Timber			<b>Count:</b>	22	
<b>Element Type:</b>	Timber Posts			<b>Total Quantity:</b>	22	
<b>Environment:</b>	Severe			<b>Not Inspected:</b>	<input type="checkbox"/>	
<b>Protection System</b>	None				<b>Performance Deficiencies</b>	<b>Maintenance Needs</b>
<b>Units</b>	<b>Excellent</b>	<b>Good</b>	<b>Fair</b>	<b>Poor</b>		
each	-	22	-	-	-	-
<b>Comments:</b>	Many rotated spacers observed on deck barrier. Checks and splits observed in timber posts. Posts are generally in good condition.					
	None <input checked="" type="checkbox"/>	1 – 5 years <input type="checkbox"/>	< 1 year <input type="checkbox"/>	Urgent <input type="checkbox"/>		

<b>Element Group:</b>	Sidewalks/Curbs			<b>Length:</b>	16.5 m	
<b>Element Name:</b>	Curbs			<b>Width:</b>	0.6 m	
<b>Location:</b>	East & West Sides of Structure			<b>Height:</b>	0.1 m	
<b>Material:</b>	Concrete			<b>Count:</b>	2	
<b>Element Type:</b>	Concrete Curb			<b>Total Quantity:</b>	23.1 m <sup>2</sup>	
<b>Environment:</b>	Severe			<b>Not Inspected:</b>	<input type="checkbox"/>	
<b>Protection System</b>	None				<b>Performance Deficiencies</b>	<b>Maintenance Needs</b>
<b>Units</b>	<b>Excellent</b>	<b>Good</b>	<b>Fair</b>	<b>Poor</b>		
m <sup>2</sup>	-	23.1	-	-	-	-
<b>Comments:</b>	Narrow cracks observed on horizontal face and vertical face of curb. Small spall noted at southeast corner.					
	None <input checked="" type="checkbox"/>	1 – 5 years <input type="checkbox"/>	< 1 year <input type="checkbox"/>	Urgent <input type="checkbox"/>		

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ELEMENT DATA						
<b>Element Group:</b>	Deck			<b>Length:</b>	16.5 m	
<b>Element Name:</b>	Wearing Surface			<b>Width:</b>	7.15 m	
<b>Location:</b>	Top of Deck			<b>Height:</b>	-	
<b>Material:</b>	Asphalt			<b>Count:</b>	1	
<b>Element Type:</b>	Asphalt Wearing Surface			<b>Total Quantity:</b>	117.98 m <sup>2</sup>	
<b>Environment:</b>	Severe			<b>Not Inspected:</b>	<input type="checkbox"/>	
<b>Protection System</b>	None				<b>Performance Deficiencies</b>	<b>Maintenance Needs</b>
<b>Units</b>	<b>Excellent</b>	<b>Good</b>	<b>Fair</b>	<b>Poor</b>		
m <sup>2</sup>	-	111.98	5.0	1	-	12
<b>Comments:</b> Generally in good condition with minor scaling and some small gouges in the middle of roadway. Small potholes observed on the deck. None <input type="checkbox"/> 1 – 5 years <input checked="" type="checkbox"/> < 1 year <input type="checkbox"/> Urgent <input type="checkbox"/>						

<b>Element Group:</b>	Decks			<b>Length:</b>	16.5 m	
<b>Element Name:</b>	Deck Top (Covered)			<b>Width:</b>	8.4 m	
<b>Location:</b>	Top of Deck			<b>Height:</b>	-	
<b>Material:</b>	Concrete			<b>Count:</b>	138.6 m <sup>2</sup>	
<b>Element Type:</b>	Thick Slab			<b>Total Quantity:</b>	m <sup>2</sup>	
<b>Environment:</b>	Moderate			<b>Not Inspected:</b>	<input checked="" type="checkbox"/>	
<b>Protection System</b>	None				<b>Performance Deficiencies</b>	<b>Maintenance Needs</b>
<b>Units</b>	<b>Excellent</b>	<b>Good</b>	<b>Fair</b>	<b>Poor</b>		
m <sup>2</sup>	-	138.6	-	-	-	-
<b>Comments:</b> Deck top not visible due to asphalt wearing surface; rating is based on condition of deck wearing surface and soffit. None <input checked="" type="checkbox"/> 1 – 5 years <input type="checkbox"/> < 1 year <input type="checkbox"/> Urgent <input type="checkbox"/>						

<b>Element Group:</b>	Decks			<b>Length:</b>	16.5 m	
<b>Element Name:</b>	Soffit - Thin Slab (Exterior)			<b>Width:</b>	0.8 m	
<b>Location:</b>	East & West Underside of Deck			<b>Height:</b>	0.5 m	
<b>Material:</b>	Concrete			<b>Count:</b>	2	
<b>Element Type:</b>	Cast-In-Place Concrete			<b>Total Quantity:</b>	42.9 m <sup>2</sup>	
<b>Environment:</b>	Moderate			<b>Not Inspected:</b>	<input type="checkbox"/>	
<b>Protection System</b>	None				<b>Performance Deficiencies</b>	<b>Maintenance Needs</b>
<b>Units</b>	<b>Excellent</b>	<b>Good</b>	<b>Fair</b>	<b>Poor</b>		
m <sup>2</sup>	-	42.9	-	-	-	-
<b>Comments:</b> Generally in good condition with damp stains, narrow transverse cracks and map cracks. Efflorescence and narrow longitudinal cracks with damp stains noted on fascias. None <input checked="" type="checkbox"/> 1 – 5 years <input type="checkbox"/> < 1 year <input type="checkbox"/> Urgent <input type="checkbox"/>						

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ELEMENT DATA						
<b>Element Group:</b>	Decks			<b>Length:</b>	16.5 m	
<b>Element Name:</b>	Soffit - Thin Slab (Interior)			<b>Width:</b>	6.2 m	
<b>Location:</b>	Underside of Deck			<b>Height:</b>	-	
<b>Material:</b>	Concrete			<b>Count:</b>	1	
<b>Element Type:</b>	Thick Slab			<b>Total Quantity:</b>	102.3 m <sup>2</sup>	
<b>Environment:</b>	Benign			<b>Not Inspected:</b>	<input type="checkbox"/>	
<b>Protection System</b>	None				<b>Performance Deficiencies</b>	<b>Maintenance Needs</b>
<b>Units</b>	<b>Excellent</b>	<b>Good</b>	<b>Fair</b>	<b>Poor</b>		
m <sup>2</sup>	-	102.3	-	-	-	-
<b>Comments:</b> Generally in good condition with damp stains, narrow transverse and map cracks						
None <input checked="" type="checkbox"/> 1 – 5 years <input type="checkbox"/> < 1 year <input type="checkbox"/> Urgent <input type="checkbox"/>						

<b>Element Group:</b>	Beams/MLE's			<b>Length:</b>	15.9 m	
<b>Element Name:</b>	Girders			<b>Width:</b>	0.20 m	
<b>Location:</b>	Underside of Structure			<b>Height:</b>	0.65 m	
<b>Material:</b>	Weathering Steel			<b>Count:</b>	3	
<b>Element Type:</b>	Steel I Girders			<b>Total Quantity:</b>	90.63 m <sup>2</sup>	
<b>Environment:</b>	Moderate			<b>Not Inspected:</b>	<input type="checkbox"/>	
<b>Protection System</b>	None				<b>Performance Deficiencies</b>	<b>Maintenance Needs</b>
<b>Units</b>	<b>Excellent</b>	<b>Good</b>	<b>Fair</b>	<b>Poor</b>		
m <sup>2</sup>	-	90.63	-	-	-	-
<b>Comments:</b> Girders are in good condition with some localized light corrosion observed.						
None <input checked="" type="checkbox"/> 1 – 5 years <input type="checkbox"/> < 1 year <input type="checkbox"/> Urgent <input type="checkbox"/>						

<b>Element Group:</b>	Beams/MLE's			<b>Length:</b>	2.1 m	
<b>Element Name:</b>	Diaphragms			<b>Width:</b>	0.102 m	
<b>Location:</b>	Underside of Structure			<b>Height:</b>	0.33 m	
<b>Material:</b>	Weathering Steel			<b>Count:</b>		
<b>Element Type:</b>	Diaphragm			<b>Total Quantity:</b>	6	
<b>Environment:</b>	Moderate			<b>Not Inspected:</b>	<input type="checkbox"/>	
<b>Protection System</b>	None				<b>Performance Deficiencies</b>	<b>Maintenance Needs</b>
<b>Units</b>	<b>Excellent</b>	<b>Good</b>	<b>Fair</b>	<b>Poor</b>		
Each	-	6	-	-	-	-
<b>Comments:</b> Diaphragms are in good condition with some localized light corrosion.						
None <input checked="" type="checkbox"/> 1 – 5 years <input type="checkbox"/> < 1 year <input type="checkbox"/> Urgent <input type="checkbox"/>						

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ELEMENT DATA							
<b>Element Group:</b>	Abutments			<b>Length:</b>	0.9 m		
<b>Element Name:</b>	Abutment Walls			<b>Width:</b>	8.05 m		
<b>Location:</b>	North & South Underside of Structure			<b>Height:</b>	5.93 m		
<b>Material:</b>	Concrete			<b>Count:</b>	2		
<b>Element Type:</b>	Cast-in-Place Concrete			<b>Total Quantity:</b>	95.47 m <sup>2</sup>		
<b>Environment:</b>	Benign			<b>Not Inspected:</b>	<input type="checkbox"/>		
<b>Protection System</b>	None					<b>Performance Deficiencies</b>	<b>Maintenance Needs</b>
<b>Units</b>	<b>Excellent</b>	<b>Good</b>	<b>Fair</b>	<b>Poor</b>			
m <sup>2</sup>	-	95.47	-	-	-	-	
<b>Comments:</b> Visible portion is generally in good condition with narrow transverse cracks and damp stains. Rust stains originating from girders on north abutment wall.							
None <input checked="" type="checkbox"/> 1 – 5 years <input type="checkbox"/> < 1 year <input type="checkbox"/> Urgent <input type="checkbox"/>							

<b>Element Group:</b>	Abutments			<b>Length:</b>	1.5 m		
<b>Element Name:</b>	Wingwalls			<b>Width:</b>	-		
<b>Location:</b>	NE, NW, SW & SW of Structure			<b>Height:</b>	5.25 m		
<b>Material:</b>	Concrete			<b>Count:</b>	4		
<b>Element Type:</b>	Cast-in-Place Concrete			<b>Total Quantity:</b>	31.5 m <sup>2</sup>		
<b>Environment:</b>	Benign			<b>Not Inspected:</b>	<input type="checkbox"/>		
<b>Protection System</b>	None					<b>Performance Deficiencies</b>	<b>Maintenance Needs</b>
<b>Units</b>	<b>Excellent</b>	<b>Good</b>	<b>Fair</b>	<b>Poor</b>			
m <sup>2</sup>	-	31.5	-	-	-	-	
<b>Comments:</b> Generally in good condition with narrow horizontal cracks.							
None <input checked="" type="checkbox"/> 1 – 5 years <input type="checkbox"/> < 1 year <input type="checkbox"/> Urgent <input type="checkbox"/>							

<b>Element Group:</b>	Foundations			<b>Length:</b>	-		
<b>Element Name:</b>	Foundations (below ground level)			<b>Width:</b>	-		
<b>Location:</b>	Below Abutments			<b>Height:</b>	-		
<b>Material:</b>	Unknown			<b>Count:</b>	-		
<b>Element Type:</b>	Unknown			<b>Total Quantity:</b>	-		
<b>Environment:</b>	Benign			<b>Not Inspected:</b>	<input checked="" type="checkbox"/>		
<b>Protection System</b>	Unknown					<b>Performance Deficiencies</b>	<b>Maintenance Needs</b>
<b>Units</b>	<b>Excellent</b>	<b>Good</b>	<b>Fair</b>	<b>Poor</b>			
N/A	-	-	-	-	-	-	
<b>Comments:</b> No visible evidence of foundation instability at time of inspection.							
None <input checked="" type="checkbox"/> 1 – 5 years <input type="checkbox"/> < 1 year <input type="checkbox"/> Urgent <input type="checkbox"/>							



MUNICIPAL STRUCTURE INSPECTION FORM

BRIDGE

Site No.: 12

ELEMENT DATA						
<b>Element Group:</b>	Embankment and Streams			<b>Length:</b>	-	
<b>Element Name:</b>	Embankments			<b>Width:</b>	-	
<b>Location:</b>	NE, NW, N, SE, SW & S of Structure			<b>Height:</b>	-	
<b>Material:</b>	Native			<b>Count:</b>	6	
<b>Element Type:</b>	Embankment			<b>Total Quantity:</b>	6	
<b>Environment:</b>	Benign			<b>Not Inspected:</b>	<input type="checkbox"/>	
<b>Protection System</b>	Rock Protection				<b>Performance Deficiencies</b>	<b>Maintenance Needs</b>
<b>Units</b>	<b>Excellent</b>	<b>Good</b>	<b>Fair</b>	<b>Poor</b>		
each	-	6	-	-	-	-
<b>Comments:</b> Moderately sloped, no vegetation and stable with rocks for slope protection. Drainage pipes noted at embankments.						
None <input checked="" type="checkbox"/> 1 – 5 years <input type="checkbox"/> < 1 year <input type="checkbox"/> Urgent <input type="checkbox"/>						

<b>Element Group:</b>	Embankment and Streams			<b>Length:</b>	-	
<b>Element Name:</b>	Slope Protection			<b>Width:</b>	-	
<b>Location:</b>	NE, NW, N, SE, SW & S of Structure			<b>Height:</b>	-	
<b>Material:</b>	Rocks			<b>Count:</b>	6	
<b>Element Type:</b>	Rock Slope Protection			<b>Total Quantity:</b>	6	
<b>Environment:</b>	Benign			<b>Not Inspected:</b>	<input type="checkbox"/>	
<b>Protection System</b>	None				<b>Performance Deficiencies</b>	<b>Maintenance Needs</b>
<b>Units</b>	<b>Excellent</b>	<b>Good</b>	<b>Fair</b>	<b>Poor</b>		
each	-	6	-	-	-	-
<b>Comments:</b> Rock protection is in good condition.						
None <input checked="" type="checkbox"/> 1 – 5 years <input type="checkbox"/> < 1 year <input type="checkbox"/> Urgent <input type="checkbox"/>						

<b>Element Group:</b>	Embankment and Streams			<b>Length:</b>	-	
<b>Element Name:</b>	Streams and Waterways			<b>Width:</b>	-	
<b>Location:</b>	Below Structure			<b>Height:</b>	-	
<b>Material:</b>	Native			<b>Count:</b>	-	
<b>Element Type:</b>	Stream			<b>Total Quantity:</b>	All	
<b>Environment:</b>	Benign			<b>Not Inspected:</b>	<input type="checkbox"/>	
<b>Protection System</b>	None				<b>Performance Deficiencies</b>	<b>Maintenance Needs</b>
<b>Units</b>	<b>Excellent</b>	<b>Good</b>	<b>Fair</b>	<b>Poor</b>		
each	-	All	-	-	-	-
<b>Comments:</b> Moderate volume and moderate flow from west to east with no visible flow obstructions.						
None <input checked="" type="checkbox"/> 1 – 5 years <input type="checkbox"/> < 1 year <input type="checkbox"/> Urgent <input type="checkbox"/>						

**MUNICIPAL STRUCTURE INSPECTION FORM**

**BRIDGE**

Site No.: 12

REPAIR AND REHABILITATION REQUIRED		Priority			Estimated Cost
Element	Repair and Rehabilitation Required	6 - 10 Years	1 - 5 Years	< 1 year	
Approaches	Install Code Compliant End Treatment			X	\$ 24,000.00
<b>Total Cost</b>					<b>\$ 24,000.00</b>

ASSOCIATED WORK	Comments	Estimated Cost
Approaches		
Detours		
Traffic Control		
Utilities		
Right of Way		
Environmental Study		
Other		
Contingencies		
<b>Total Cost</b>		<b>\$</b>

JUSTIFICATION

MUNICIPAL STRUCTURE INSPECTION FORM

BRIDGE

SITE PHOTOGRAPHS

Site No.:12



Photo 1 Structure from north approach



Photo 2 Structure from south approach

MUNICIPAL STRUCTURE INSPECTION FORM

BRIDGE

SITE PHOTOGRAPHS

Site No.:12



Photo 3 North approach from centre of structure



Photo 4 South approach from centre of structure

MUNICIPAL STRUCTURE INSPECTION FORM

BRIDGE

SITE PHOTOGRAPHS

Site No.:12



Photo 5 East elevation



Photo 6 West elevation

MUNICIPAL STRUCTURE INSPECTION FORM

BRIDGE

SITE PHOTOGRAPHS

Site No.:12



Photo 7 Collision damage noted on approach barrier at northeast corner



Photo 8 Checks and splits on barrier post with damaged and rotated spacer block

MUNICIPAL STRUCTURE INSPECTION FORM

BRIDGE

SITE PHOTOGRAPHS

Site No.:12



Photo 9 Vehicle damaged noted on deck barrier at southeast corner



Photo 10 Washout noted in wearing surface at north approach

MUNICIPAL STRUCTURE INSPECTION FORM

BRIDGE

SITE PHOTOGRAPHS

Site No.:12



Photo 11 Minor scaling and small gouges noted in middle of deck wearing surface



Photo 12 Small spall noted in curb at southeast corner



MUNICIPAL STRUCTURE INSPECTION FORM

BRIDGE

SITE PHOTOGRAPHS

Site No.:12



Photo 13 North underside of structure



Photo 14 Typical northwest wingwall

MUNICIPAL STRUCTURE INSPECTION FORM

BRIDGE

SITE PHOTOGRAPHS

Site No.:12



Photo 15 North abutment wall



Photo 16 South abutment wall

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**ATTACHMENT 2**

***OSIM INSPECTION REPORTS & BCI FORMS***

***CULVERTS***

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## Structure Condition Summary Form

**Structure Name** Grand Desert Road Culvert  
**Structure Number** 03  
**Date of Inspection** June 03, 2022  
**Project No.** 22035  
**Consultant** HP Engineering Inc.

Element Group	Element Name	Unit (Qty.)	Unit Price (MTO)	Total Element Quantity	Element Qty. in Excellent Condition (1.00)	Element Quantity in Good Condition (0.75)	Element Quantity in Fair Condition (0.4)	Element Quantity in Poor Condition (0)	Total Replacement Value (TRV)	Current Element Value (CEV)	Element Condition Index	Performance Deficiency	Maintenance Need
Approaches	Wearing Surface	Sq.m	6.00	303.00	0.00	253.00	50.00	0.00	1818	1259	69	00	00
Culvert	Barrel	Sq.m	350.00	96.63	0.00	94.63	2.00	0.00	33821	25120	74	00	00
Retaining Walls	Walls	Sq.m	350.00	12.00	0.00	12.00	0.00	0.00	4200	3150	75	00	00

**39839**    **29529**

**Bridge Condition Index (BCI)**

**74**

$I_t$

0

Importance Factor for Traffic

$I_c$

0

Importance Factor for Economic Impacts

$I_w$

0

Importance Factor for Bridge Width

$I_p$

0

Importance Factor for Bridge Profile or Alignment

**Bridge Sufficiency Index (BSI)**

**74**

**MUNICIPAL STRUCTURE INSPECTION FORM**

**CULVERT**

**Site No.: 03**

S

INVENTORY DATA:			
Structure Name	<u>Grand Desert Road Culvert</u>		
Main Hwy/Road #	<u>                    </u> On <input checked="" type="checkbox"/> Under <input type="checkbox"/>	Crossing Type:	Navigable Water <input type="checkbox"/> Non- Navigable Water <input checked="" type="checkbox"/> Rail <input type="checkbox"/> Road <input checked="" type="checkbox"/> Ped <input type="checkbox"/> Other <input type="checkbox"/>
Road Name:	<u>Grand Desert Road</u>		
Structure Location	<u>Creek 2.8 km south of Boxwell road , Lot 23, Con 3 Bonfield Ontario over Sharpes</u>		
Latitude	<u>46° 12' 18.7" N</u>	Longitude	<u>79° 3' 34.6" W</u>
Owner(s)	<u>Township of Bonfield</u>	Heritage Designation	Not Cons. <input checked="" type="checkbox"/> Cons./Not App. <input type="checkbox"/> List/Not Desig. <input type="checkbox"/> Desig./not List <input type="checkbox"/> Desig. & List <input type="checkbox"/>
MTO Region	<u>Northeastern</u>	Road Class:	Freeway <input type="checkbox"/> Arterial <input type="checkbox"/> Collector <input type="checkbox"/> Local <input checked="" type="checkbox"/>
MTO District	<u>Sudbury</u>	Posted Speed	<u>40 km/h</u> No. of Lanes <u>1</u>
Old County	<u>Nipissing</u>	AADT	<u>                    </u> % Trucks <u>                    </u>
Geographic Twp.	<u>Bonfield</u>	Special Routes	Transit <input type="checkbox"/> Truck <input type="checkbox"/> School <input type="checkbox"/> Bicycle <input type="checkbox"/>
Structure Type	<u>Concrete Culvert</u>	Detour Length Around Structure	<u>                    </u> (km)
Total Deck Length	<u>9.28</u> (m)	Fill on Structure	<u>                    </u> (m)
Overall Str. Width	<u>5.52</u> (m)	Skew Angle	<u>0</u> (Degrees)
Total Deck Area	<u>51.23</u> (m <sup>2</sup> )	Direction of Structure	<u>E-W</u>
Roadway Width	<u>4.75</u> (m)	No. of Spans	<u>1</u> (m)
Span Lengths	<u>9.28</u> (m)		

HISTORICAL DATA			
Year Built	<u>2009</u>	Last Biennial Inspection	<u>August 7, 2020</u>
Current Load Limit	<u>                    </u> (tonnes)	Last Bridge Master Inspection	<u>                    </u>
Load Limit By-Law #	<u>                    </u>	Last Evaluation	<u>                    </u>
By-Law Expiry Date	<u>                    </u>	Last Underwater Inspection	<u>                    </u>
Min. Vertical Clearance	<u>                    </u> (m)	Last Condition Survey	<u>                    </u>
<b>Rehabilitation History: (Date / Description)</b>			
<u>- Structure replaced in 2009</u>			

**MUNICIPAL STRUCTURE INSPECTION FORM**

**CULVERT**

**Site No.: 03**

FIELD INSPECTION INFORMATION	
Date of Inspection:	June 03, 2022
Inspector:	Tashi Dwivedi, P. Eng., HP Engineering
Others in Party:	Nicholas Brown, HP Engineering
Equipment Used:	Digital camera, measuring tape, hammer
Weather:	Sunny
Temperature:	16 °C

ADDITIONAL INVESTIGATION REQUIRED	Priority			Estimated Cost
	None	Normal	Urgent	
Detailed Deck Condition Survey:	X			\$
Bridge Rehabilitation / Replacement Study:		X		\$ 5,000.00
Detailed Coating Condition Survey:	X			\$
Underwater Investigation:	X			\$
Fatigue Investigation:	X			\$
Seismic Investigation:	X			\$
Structural Evaluation:	X			\$
Load Posting - Estimated Load			Total Cost	\$ <b>5,000.00</b>

Special Notes:

Rehabilitation / replacement study is for barrier only.

Approach barrier end treatments are substandard and should be replaced with code compliant end treatments. Some medium potholes and longitudinal grooves on the east approach. Some localized map cracks were observed on the north and south ends of the barrel. Bug holes observed in barrel.

Next Detailed Inspection:

June 2024

Suspected Performance Deficiencies

- |  |  |                              |
|--|--|------------------------------|
| 00 None  | 06 Bearing not uniformly loaded/unstable | 12 Slippery surfaces         |
| 01 Load carrying capacity                          | 07 Jammed expansion joint                | 13 Flooding/channel blockage |
| 02 Excessive deformations (deflections & rotation) | 08 Pedestrian/vehicular hazard           | 14 Undermining of foundation |
| 03 Continuing settlement                           | 09 Rough riding surface                  | 15 Unstable embankments      |
| 04 Continuing movements                            | 10 Surface ponding                       | 16 Other                     |
| 05 Seized bearings                                 | 11 Deck drainage                         |                              |

Maintenance Needs

- |                                      |                               |                               |
|--------------------------------------|-------------------------------|-------------------------------|
| 01 Lift and swing bridge maintenance | 07 Repair of structural steel | 13 Erosion control at bridges |
| 02 Bridge cleaning                   | 08 Repair of bridge concrete  | 14 Concrete sealing           |
| 03 Bridge handrail maintenance       | 09 Repair of bridge timber    | 15 Rout and seal              |
| 04 Painting steel bridge structures  | 10 Bailey bridges maintenance | 16 Bridge deck drainage       |
| 05 Bridge deck joint repair          | 11 Animal/pest control        | 17 Other                      |
| 06 Bridge bearing maintenance        | 12 Bridge surface repair      |                               |

**MUNICIPAL STRUCTURE INSPECTION FORM**

**CULVERT**

**Site No.: 03**

ELEMENT DATA						
<b>Element Group:</b>	Approaches			<b>Length:</b>	27 m	
<b>Element Name:</b>	Barrier			<b>Width:</b>	-	
<b>Location:</b>	NE, NW, SE, & SW of Structure			<b>Height:</b>	-	
<b>Material:</b>	Steel			<b>Count:</b>	4	
<b>Element Type:</b>	Steel Flex Beam on Wood Posts			<b>Total Quantity:</b>	108 m	
<b>Environment:</b>	Severe			<b>Not Inspected:</b>	<input type="checkbox"/>	
<b>Protection System</b>	None				<b>Performance Deficiencies</b>	<b>Maintenance Needs</b>
<b>Units</b>	<b>Excellent</b>	<b>Good</b>	<b>Fair</b>	<b>Poor</b>		
m	-	108	-	-	08	18- Fix Wood spots
<b>Comments:</b> Generally in good condition with few checks and splits noted on wood posts. Barrier end treatments are substandard and should be replaced with code compliant end treatments. Rotated spacer blocks noted on barriers. Impact noted at southwest end. None <input type="checkbox"/> 1 – 5 years <input type="checkbox"/> < 1 year <input checked="" type="checkbox"/> Urgent <input type="checkbox"/>						

<b>Element Group:</b>	Approaches			<b>Length:</b>	30 m	
<b>Element Name:</b>	Wearing Surface			<b>Width:</b>	4.75 m	
<b>Location:</b>	East & West of Structure			<b>Height:</b>	-	
<b>Material:</b>	Gravel/ Asphalt			<b>Count:</b>	2	
<b>Element Type:</b>	Wearing Surface			<b>Total Quantity:</b>	285 m <sup>2</sup>	
<b>Environment:</b>	Severe			<b>Not Inspected:</b>	<input type="checkbox"/>	
<b>Protection System</b>	None				<b>Performance Deficiencies</b>	<b>Maintenance Needs</b>
<b>Units</b>	<b>Excellent</b>	<b>Good</b>	<b>Fair</b>	<b>Poor</b>		
m <sup>2</sup>	-	235	50	0	00	00
<b>Comments:</b> Generally in good to fair condition with some medium potholes and longitudinal grooves on the east approach. None <input checked="" type="checkbox"/> 1 – 5 years <input type="checkbox"/> < 1 year <input type="checkbox"/> Urgent <input type="checkbox"/>						

<b>Element Group:</b>	Signs			<b>Length:</b>	-	
<b>Element Name:</b>	Signs			<b>Width:</b>	-	
<b>Location:</b>	NE, NW, SE & SW of Structure			<b>Height:</b>	-	
<b>Material:</b>	Steel			<b>Count:</b>	7	
<b>Element Type:</b>	Narrow Road Signs & hazard signs			<b>Total Quantity:</b>	7	
<b>Environment:</b>	Severe			<b>Not Inspected:</b>	<input type="checkbox"/>	
<b>Protection System</b>	Hot-Dip Galvanized				<b>Performance Deficiencies</b>	<b>Maintenance Needs</b>
<b>Units</b>	<b>Excellent</b>	<b>Good</b>	<b>Fair</b>	<b>Poor</b>		
Each	-	6	1	-	-	-
<b>Comments:</b> Narrow road sign at east approaches is in good condition. Hazard sign at west is deformed. Northeast hazard sign is damaged. A 2 <sup>nd</sup> narrow road sign is present further on the east approach None <input checked="" type="checkbox"/> 1 – 5 years <input type="checkbox"/> < 1 year <input type="checkbox"/> Urgent <input type="checkbox"/>						

**MUNICIPAL STRUCTURE INSPECTION FORM**

**CULVERT**

**Site No.: 03**

<b>Element Group:</b>	Culvert	<b>Length:</b>	9.28 m			
<b>Element Name:</b>	Barrel	<b>Width:</b>	5.52 m			
<b>Location:</b>	Below roadway	<b>Height:</b>	2.17 m			
<b>Material:</b>	Concrete	<b>Count:</b>	1			
<b>Element Type:</b>	Cast-In-Place Concrete	<b>Total Quantity:</b>	96.63m <sup>2</sup>			
<b>Environment:</b>	Moderate	<b>Not Inspected:</b>	<input type="checkbox"/>			
<b>Protection System</b>	None				<b>Performance Deficiencies</b>	<b>Maintenance Needs</b>
<b>Units</b>	<b>Excellent</b>	<b>Good</b>	<b>Fair</b>	<b>Poor</b>		
m <sup>2</sup>	-	94.63	2	-	-	-
<b>Comments:</b>	Generally in good condition with some small spalls. Some localized map cracks were observed on the north and south ends of the barrel. Bug holes observed in barrel.					
	None <input type="checkbox"/>	1 – 5 years <input checked="" type="checkbox"/>	< 1 year <input type="checkbox"/>	Urgent <input type="checkbox"/>		

<b>Element Group:</b>	Foundations	<b>Length:</b>	-			
<b>Element Name:</b>	Foundations (below ground level)	<b>Width:</b>	-			
<b>Location:</b>	Below Structure	<b>Height:</b>	-			
<b>Material:</b>	Unknown	<b>Count:</b>	-			
<b>Element Type:</b>	Unknown	<b>Total Quantity:</b>	-			
<b>Environment:</b>	Benign	<b>Not Inspected:</b>	<input type="checkbox"/>			
<b>Protection System</b>	Unknown				<b>Performance Deficiencies</b>	<b>Maintenance Needs</b>
<b>Units</b>	<b>Excellent</b>	<b>Good</b>	<b>Fair</b>	<b>Poor</b>		
N/A	-	-	-	-	-	-
<b>Comments:</b>	No evidence of foundation instability noted at the time of inspection.					
	None <input checked="" type="checkbox"/>	1 – 5 years <input type="checkbox"/>	< 1 year <input type="checkbox"/>	Urgent <input type="checkbox"/>		

<b>Element Group:</b>	Retaining walls	<b>Length:</b>	3 m			
<b>Element Name:</b>	Walls	<b>Width:</b>	-			
<b>Location:</b>	NE, NW, SE, & SW of Structure	<b>Height:</b>	-			
<b>Material:</b>	Stones	<b>Count:</b>	4			
<b>Element Type:</b>	Gabion Baskets	<b>Total Quantity:</b>	12 m			
<b>Environment:</b>	Benign	<b>Not Inspected:</b>	<input type="checkbox"/>			
<b>Protection System</b>	None				<b>Performance Deficiencies</b>	<b>Maintenance Needs</b>
<b>Units</b>	<b>Excellent</b>	<b>Good</b>	<b>Fair</b>	<b>Poor</b>		
m	-	12	-	-	-	-
<b>Comments:</b>	Gabion baskets are in good condition.					
	None <input checked="" type="checkbox"/>	1 – 5 years <input type="checkbox"/>	< 1 year <input type="checkbox"/>	Urgent <input type="checkbox"/>		



**MUNICIPAL STRUCTURE INSPECTION FORM**

**CULVERT**

**Site No.: 03**

<b>Element Group:</b>	Embankment and Streams			<b>Length:</b>	-	
<b>Element Name:</b>	Embankments			<b>Width:</b>	-	
<b>Location:</b>	NE, NW, SE, & SW of Structure			<b>Height:</b>	-	
<b>Material:</b>	Native			<b>Count:</b>	4	
<b>Element Type:</b>	Embankment			<b>Total Quantity:</b>	4	
<b>Environment:</b>	Benign			<b>Not Inspected:</b>	<input type="checkbox"/>	
<b>Protection System</b>	Rock Protection				<b>Performance Deficiencies</b>	<b>Maintenance Needs</b>
<b>Units</b>	<b>Excellent</b>	<b>Good</b>	<b>Fair</b>	<b>Poor</b>		
Each	-	4	-	-	-	-
<b>Comments:</b> Moderately sloped and appear stable with rock slope protection.						
None <input checked="" type="checkbox"/> 1 – 5 years <input type="checkbox"/> < 1 year <input type="checkbox"/> Urgent <input type="checkbox"/>						

<b>Element Group:</b>	Embankment and Streams			<b>Length:</b>	-	
<b>Element Name:</b>	Slope Protection			<b>Width:</b>	-	
<b>Location:</b>	NE, NW, SE, & SW of Structure			<b>Height:</b>	-	
<b>Material:</b>	Rocks			<b>Count:</b>	4	
<b>Element Type:</b>	Slope Protection			<b>Total Quantity:</b>	4	
<b>Environment:</b>	Benign			<b>Not Inspected:</b>	<input type="checkbox"/>	
<b>Protection System</b>	None				<b>Performance Deficiencies</b>	<b>Maintenance Needs</b>
<b>Units</b>	<b>Excellent</b>	<b>Good</b>	<b>Fair</b>	<b>Poor</b>		
Each	-	4	-	-	-	-
<b>Comments:</b> Generally in good condition.						
None <input checked="" type="checkbox"/> 1 – 5 years <input type="checkbox"/> < 1 year <input type="checkbox"/> Urgent <input type="checkbox"/>						

<b>Element Group:</b>	Embankment and Streams			<b>Length:</b>	-	
<b>Element Name:</b>	Streams and Waterways			<b>Width:</b>	-	
<b>Location:</b>	Below Structure			<b>Height:</b>	-	
<b>Material:</b>	Native			<b>Count:</b>	-	
<b>Element Type:</b>	Stream			<b>Total Quantity:</b>	all	
<b>Environment:</b>	Benign			<b>Not Inspected:</b>	<input type="checkbox"/>	
<b>Protection System</b>	None				<b>Performance Deficiencies</b>	<b>Maintenance Needs</b>
<b>Units</b>	<b>Excellent</b>	<b>Good</b>	<b>Fair</b>	<b>Poor</b>		
All	-	all	-	-	-	-
<b>Comments:</b> Moderate volume and low flow from south to north with no visible obstructions noted in the stream at the time of inspection.						
None <input checked="" type="checkbox"/> 1 – 5 years <input type="checkbox"/> < 1 year <input type="checkbox"/> Urgent <input type="checkbox"/>						

**MUNICIPAL STRUCTURE INSPECTION FORM**

**CULVERT**

**Site No.: 03**

REPAIR AND REHABILITATION REQUIRED		Priority			Estimated Cost
Element	Repair and Rehabilitation Required	6 - 10 Years	1 - 5 Years	< 1 year	
Approaches	Install code compliant end treatments			X	\$ 24,000.00
<b>Total Cost</b>					<b>\$ 24,000.00</b>

ASSOCIATED WORK	Comments	Estimated Cost
Approaches		
Detours		
Traffic Control		
Utilities		
Right of Way		
Environmental Study		
Other		
Contingencies		
<b>Total Cost</b>		<b>\$</b>

JUSTIFICATION

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

SITE PHOTOGRAPHS

Site No.: 03



Photo 1 Structure from east approach



Photo 2 Structure from west approach

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

SITE PHOTOGRAPHS

Site No.: 03



Photo 3 East approach from centre of structure



Photo 4 West approach from centre of structure

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

SITE PHOTOGRAPHS

Site No.: 03



Photo 5 North elevation



Photo 6 South elevation

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

SITE PHOTOGRAPHS

Site No.: 03



Photo 7 Tire rutting and loose gravel on east approach.



Photo 8 Longitudinal grooves on structure wearing surface

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

SITE PHOTOGRAPHS

Site No.: 03



Photo 9 Stained map cracks noted on exterior face of soffit



Photo 10 Narrow transverse crack noted in centre of soffit at south end

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

SITE PHOTOGRAPHS

Site No.: 03



Photo 11 Typical view gabion basket wall and slope protection at southwest corner



Photo 12 Bug holes noted throughout barrel soffit



### Structure Condition Summary Form

**Structure Name** Grand Desert Road Culvert  
**Structure Number** 04  
**Date of Inspection** June 03 , 2022  
**Project No.** 22035  
**Consultant** HP Engineering Inc.

Element Group	Element Name	Unit (Qty.)	Unit Price (MTO)	Total Element Quantity	Element Qty. in Excellent Condition (1.00)	Element Quantity in Good Condition (0.75)	Element Quantity in Fair Condition (0.4)	Element Quantity in Poor Condition (0)	Total Replacement Value (TRV)	Current Element Value (CEV)	Element Condition Index	Performance Deficiency	Maintenance Need
Approaches	Wearing Surface	Sq.m	6.00	468.00	0.00	438.00	20.00	10.00	2808	2019	72	09	13
	Barrel	Sq.m	350.00	258.24	0.00	0.00	129.12	129.12	90384	18077	20	01	00
Culvert	Inlet Components	Sq.m	350.00	4.00	0.00	4.00	0.00	0.00	1400	1050	75	00	00
	Outlet Components	Sq.m	350.00	4.00	0.00	4.00	0.00	0.00	1400	1050	75	00	00
									<b>95992</b>	<b>22196</b>			

**Bridge Condition Index (BCI)**

**23**

- $I_t$ 

0

Importance Factor for Traffic
- $I_c$ 

0

Importance Factor for Economic Impacts
- $I_w$ 

0

Importance Factor for Bridge Width
- $I_p$ 

0

Importance Factor for Bridge Profile or Alignment

**Bridge Sufficiency Index (BSI)**

**23**

**MUNICIPAL STRUCTURE INSPECTION FORM**

**CULVERT**

**Site No.: 04**

INVENTORY DATA:			
Structure Name	<u>Grand Desert Road Culvert</u>		
Main Hwy/Road #	<u>                    </u> On <input checked="" type="checkbox"/> Under <input type="checkbox"/>	Crossing Type:	Navigable Water <input type="checkbox"/> Non- Navigable Water <input checked="" type="checkbox"/> Rail <input type="checkbox"/> Road <input checked="" type="checkbox"/> Ped <input type="checkbox"/> Other <input type="checkbox"/>
Road Name:	<u>Grand Desert Road</u>		
Structure Location	<u>1.9 km west of boundary road , Lot 26, Con 2 Bonfield Ontario over Sharpes Creek</u>		
Latitude	<u>46° 12' 31.5" N</u>	Longitude	<u>79° 2' 33.6" W</u>
Owner(s)	<u>Township of Bonfield</u>	Heritage Designation	Not Cons. <input checked="" type="checkbox"/> Cons./Not App. <input type="checkbox"/> List/Not Desig. <input type="checkbox"/> Desig./not List <input type="checkbox"/> Desig. & List <input type="checkbox"/>
MTO Region	<u>Northeastern</u>	Road Class:	Freeway <input type="checkbox"/> Arterial <input type="checkbox"/> Collector <input type="checkbox"/> Local <input checked="" type="checkbox"/>
MTO District	<u>Sudbury</u>	Posted Speed	<u>40 km/h</u> No. of Lanes <u>2</u>
Old County	<u>Nipissing</u>	AADT	<u>                    </u> % Trucks <u>                    </u>
Geographic Twp.	<u>Bonfield</u>	Special Routes	Transit <input type="checkbox"/> Truck <input type="checkbox"/> School <input type="checkbox"/> Bicycle <input type="checkbox"/>
Structure Type	<u>Circular CSP</u>	Detour Length Around Structure	<u>                    </u> (km)
Total Deck Length	<u>3</u> (m)	Fill on Structure	<u>2.4</u> (m)
Overall Str. Width	<u>27.4</u> (m)	Skew Angle	<u>21</u> (Degrees)
Total Deck Area	<u>82.2</u> (m <sup>2</sup> )	Direction of Structure	<u>N-S</u>
Roadway Width	<u>7.8</u> (m)	No. of Spans	<u>1</u> (m)
Span Lengths	<u>3</u> (m)		

HISTORICAL DATA			
Year Built	<u>1970 (est)</u>	Last Biennial Inspection	<u>August 7, 2020</u>
Current Load Limit	<u>                    </u> (tonnes)	Last Bridge Master Inspection	<u>                    </u>
Load Limit By-Law #	<u>                    </u>	Last Evaluation	<u>                    </u>
By-Law Expiry Date	<u>                    </u>	Last Underwater Inspection	<u>                    </u>
Min. Vertical Clearance	<u>                    </u> (m)	Last Condition Survey	<u>                    </u>
<b>Rehabilitation History: (Date / Description)</b>			

**MUNICIPAL STRUCTURE INSPECTION FORM**

**CULVERT**

**Site No.: 04**

FIELD INSPECTION INFORMATION	
Date of Inspection:	June 03, 2022
Inspector:	Tashi Dwivedi, P.Eng., HP Engineering
Others in Party:	Nicholas Brown, HP Engineering
Equipment Used:	Digital camera, measuring tape, hammer
Weather:	Sunny
Temperature:	20 °C

ADDITIONAL INVESTIGATION REQUIRED	Priority			Estimated Cost
	None	Normal	Urgent	
Detailed Deck Condition Survey:	X			\$
Bridge Rehabilitation / Replacement Study:		X		\$ 20,000.00
Detailed Coating Condition Survey:	X			\$
Underwater Investigation:	X			\$
Fatigue Investigation:	X			\$
Seismic Investigation:	X			\$
Structural Evaluation:	X			\$
Load Posting - Estimated Load			Total Cost	\$ <b>20,000.00</b>

Special Notes:

Rehabilitation / replacement study is for culvert barrier and barrel.  
 Low barrier with 4 buried ends does not conform to current standards and should be replaced.  
 Moderate to severe corrosion and perforations at water level; it is recommended the structure be replaced in 1-5 years. Deformation at south end of barrel.  
 Separation of plates noted along most of the west side of pipe. It is recommended to monitor the barrel movement.

Next Detailed Inspection:	June 2024
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**Suspected Performance Deficiencies**

- |  |  |                              |
|--|--|------------------------------|
| 00 None  | 06 Bearing not uniformly loaded/unstable | 12 Slippery surfaces         |
| 01 Load carrying capacity                          | 07 Jammed expansion joint                | 13 Flooding/channel blockage |
| 02 Excessive deformations (deflections & rotation) | 08 Pedestrian/vehicular hazard           | 14 Undermining of foundation |
| 03 Continuing settlement                           | 09 Rough riding surface                  | 15 Unstable embankments      |
| 04 Continuing movements                            | 10 Surface ponding                       | 16 Other                     |
| 05 Seized bearings                                 | 11 Deck drainage                         |                              |

**Maintenance Needs**

- |                                      |                               |                               |
|--------------------------------------|-------------------------------|-------------------------------|
| 01 Lift and swing bridge maintenance | 07 Repair of structural steel | 13 Erosion control at bridges |
| 02 Bridge cleaning                   | 08 Repair of bridge concrete  | 14 Concrete sealing           |
| 03 Bridge handrail maintenance       | 09 Repair of bridge timber    | 15 Rout and seal              |
| 04 Painting steel bridge structures  | 10 Bailey bridges maintenance | 16 Bridge deck drainage       |
| 05 Bridge deck joint repair          | 11 Animal/pest control        | 17 Other                      |
| 06 Bridge bearing maintenance        | 12 Bridge surface repair      |                               |

**MUNICIPAL STRUCTURE INSPECTION FORM**

**CULVERT**

**Site No.: 04**

ELEMENT DATA							
<b>Element Group:</b>	Approach		<b>Length:</b>	35 m			
<b>Element Name:</b>	Barrier		<b>Width:</b>	-			
<b>Location:</b>	North & South of Structure		<b>Height:</b>	-			
<b>Material:</b>	Steel		<b>Count:</b>	2			
<b>Element Type:</b>	Steel Beam Guiderail on Wood Posts		<b>Total Quantity:</b>	70 m			
<b>Environment:</b>	Moderate		<b>Not Inspected:</b>	<input type="checkbox"/>			
<b>Protection System</b>	Hot-Dip Galvanized				<b>Performance Deficiencies</b>	<b>Maintenance Needs</b>	
<b>Units</b>	<b>Excellent</b>	<b>Good</b>	<b>Fair</b>	<b>Poor</b>			
m	-	59	10	1	08	-	
<b>Comments:</b>	Posts are weathered with some checks and rot. Steel barrier has few dents from vehicular impact with an area of localized rust. Low barrier with 4 buried ends does not conform to current standards and should be replaced.						
None	<input type="checkbox"/>	1 – 5 years	<input type="checkbox"/>	< 1 year	<input checked="" type="checkbox"/>	Urgent	<input type="checkbox"/>

<b>Element Group:</b>	Approaches		<b>Length:</b>	30 m			
<b>Element Name:</b>	Wearing Surface		<b>Width:</b>	7.8 m			
<b>Location:</b>	East & West of Structure		<b>Height:</b>	-			
<b>Material:</b>	Gravel		<b>Count:</b>	2			
<b>Element Type:</b>	Wearing Surface		<b>Total Quantity:</b>	468 m <sup>2</sup>			
<b>Environment:</b>	Severe		<b>Not Inspected:</b>	<input type="checkbox"/>			
<b>Protection System</b>	None				<b>Performance Deficiencies</b>	<b>Maintenance Needs</b>	
<b>Units</b>	<b>Excellent</b>	<b>Good</b>	<b>Fair</b>	<b>Poor</b>			
m <sup>2</sup>	-	468	-	-	-	-	
<b>Comments:</b>	Generally in good condition with some loose gravel and localized washout on north side. Gravel accumulation noted at side of the road.						
None	<input checked="" type="checkbox"/>	1 – 5 years	<input type="checkbox"/>	< 1 year	<input type="checkbox"/>	Urgent	<input type="checkbox"/>

<b>Element Group:</b>	Culvert		<b>Length:</b>	-			
<b>Element Name:</b>	Inlet Components		<b>Width:</b>	-			
<b>Location:</b>	South of Structure		<b>Height:</b>	-			
<b>Material:</b>	Concrete		<b>Count:</b>	4			
<b>Element Type:</b>	Cast-in-Place Concrete		<b>Total Quantity:</b>	4			
<b>Environment:</b>	Moderate		<b>Not Inspected:</b>	<input checked="" type="checkbox"/>			
<b>Protection System</b>	None				<b>Performance Deficiencies</b>	<b>Maintenance Needs</b>	
<b>Units</b>	<b>Excellent</b>	<b>Good</b>	<b>Fair</b>	<b>Poor</b>			
m <sup>2</sup>	-	4	-	-	-	-	
<b>Comments:</b>	Not visible at time of inspection. Beaver dam obstructing flow through barrel at inlet.						
None	<input checked="" type="checkbox"/>	1 – 5 years	<input type="checkbox"/>	< 1 year	<input type="checkbox"/>	Urgent	<input type="checkbox"/>

**MUNICIPAL STRUCTURE INSPECTION FORM**

**CULVERT**

**Site No.: 04**

<b>Element Group:</b>	Culvert	<b>Length:</b>	-
<b>Element Name:</b>	Outlet Components	<b>Width:</b>	-
<b>Location:</b>	North of Structure	<b>Height:</b>	-
<b>Material:</b>	Concrete	<b>Count:</b>	-
<b>Element Type:</b>	Cast-in-Place Concrete	<b>Total Quantity:</b>	4 m <sup>2</sup>
<b>Environment:</b>	Moderate	<b>Not Inspected:</b>	<input type="checkbox"/>
<b>Protection System</b>	None		
<b>Units</b>	<b>Excellent</b>	<b>Good</b>	<b>Fair</b>
m <sup>2</sup>	-	4	-
<b>Comments:</b> Visible portion is in good condition with moderate scaling. Moss grown at outlet of the culvert barrel.			
None <input checked="" type="checkbox"/> 1 – 5 years <input type="checkbox"/> < 1 year <input type="checkbox"/> Urgent <input type="checkbox"/>			

<b>Element Group:</b>	Culvert	<b>Length:</b>	27.4 m
<b>Element Name:</b>	Barrel	<b>Width:</b>	3 m
<b>Location:</b>	Below Roadway	<b>Height:</b>	3 m
<b>Material:</b>	Corrugated Steel	<b>Count:</b>	1
<b>Element Type:</b>	Structural Plate CSP	<b>Total Quantity:</b>	258.24 m <sup>2</sup>
<b>Environment:</b>	Benign	<b>Not Inspected:</b>	<input type="checkbox"/>
<b>Protection System</b>	Hot-Dip Galvanized		
<b>Units</b>	<b>Excellent</b>	<b>Good</b>	<b>Fair</b>
m <sup>2</sup>	-	-	129.123
<b>Comments:</b> Moderate to severe corrosion and perforations at water level; it is recommended the structure be replaced in 1-5 years. Deformation at south end of barrel. Perforation noted at south end of barrel. Separation of plates noted along most of the west side of pipe. It is recommended to monitor the barrel movement.			
None <input type="checkbox"/> 1 – 5 years <input checked="" type="checkbox"/> < 1 year <input type="checkbox"/> Urgent <input type="checkbox"/>			

<b>Element Group:</b>	Foundations	<b>Length:</b>	-
<b>Element Name:</b>	Foundations (below ground level)	<b>Width:</b>	-
<b>Location:</b>	Below Structure	<b>Height:</b>	-
<b>Material:</b>	Unknown	<b>Count:</b>	-
<b>Element Type:</b>	Unknown	<b>Total Quantity:</b>	-
<b>Environment:</b>	Benign	<b>Not Inspected:</b>	<input type="checkbox"/>
<b>Protection System</b>	Unknown		
<b>Units</b>	<b>Excellent</b>	<b>Good</b>	<b>Fair</b>
N/A	-	-	-
<b>Comments:</b> No evidence of foundation instability/ settlement noted at the time of inspection.			
None <input checked="" type="checkbox"/> 1 – 5 years <input type="checkbox"/> < 1 year <input type="checkbox"/> Urgent <input type="checkbox"/>			

**MUNICIPAL STRUCTURE INSPECTION FORM**

**CULVERT**

**Site No.: 04**

<b>Element Group:</b>	Embankment and Streams	<b>Length:</b>	-			
<b>Element Name:</b>	Embankments	<b>Width:</b>	-			
<b>Location:</b>	NE, NW, SE, & SW of Structure	<b>Height:</b>	-			
<b>Material:</b>	Native	<b>Count:</b>	4			
<b>Element Type:</b>	Embankment	<b>Total Quantity:</b>	4			
<b>Environment:</b>	Benign	<b>Not Inspected:</b>	<input type="checkbox"/>			
<b>Protection System</b>	None				<b>Performance Deficiencies</b>	<b>Maintenance Needs</b>
<b>Units</b>	<b>Excellent</b>	<b>Good</b>	<b>Fair</b>	<b>Poor</b>		
each	-	4	-	-	-	-
<b>Comments:</b> Embankments noted steeply sloped, heavily vegetated and appear stable at the time of inspection.						
None <input checked="" type="checkbox"/> 1 – 5 years <input type="checkbox"/> < 1 year <input type="checkbox"/> Urgent <input type="checkbox"/>						

<b>Element Group:</b>	Embankment and Streams	<b>Length:</b>	-			
<b>Element Name:</b>	Streams and Waterways	<b>Width:</b>	-			
<b>Location:</b>	Under Structure	<b>Height:</b>	-			
<b>Material:</b>	Native	<b>Count:</b>	-			
<b>Element Type:</b>	Stream	<b>Total Quantity:</b>	-			
<b>Environment:</b>	Benign	<b>Not Inspected:</b>	<input type="checkbox"/>			
<b>Protection System</b>	None				<b>Performance Deficiencies</b>	<b>Maintenance Needs</b>
<b>Units</b>	<b>Excellent</b>	<b>Good</b>	<b>Fair</b>	<b>Poor</b>		
all	-	-	all	-	00	00
<b>Comments:</b> Moderate volume and high flow from south to north through barrel. High volume upstream obstructed by large beaver dam downstream.						
None <input type="checkbox"/> 1 – 5 years <input type="checkbox"/> < 1 year <input checked="" type="checkbox"/> Urgent <input type="checkbox"/>						

**MUNICIPAL STRUCTURE INSPECTION FORM**

**CULVERT**

**Site No.: 04**

REPAIR AND REHABILITATION REQUIRED		Priority			Estimated Cost
Element	Repair and Rehabilitation Required	6 - 10 Years	1 - 5 Years	< 1 year	
Barrier	Replace substandard end treatments with code compliant end treatments			X	\$ -
Culvert	Replace Barrel		X		\$ 282,000.00
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
					\$ -
<b>Total Cost</b>					<b>\$ 282,000.00</b>

ASSOCIATED WORK	Comments	Estimated Cost
Approaches		
Detours		\$ 100,000.00
Traffic Control		\$ 60,000.00
Utilities		
Right of Way		
Environmental Study		\$ 10,000.00
Other		
Contingencies		
<b>Total Cost</b>		<b>\$ 170,000.00</b>

JUSTIFICATION

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

SITE PHOTOGRAPHS

Site No.: 04

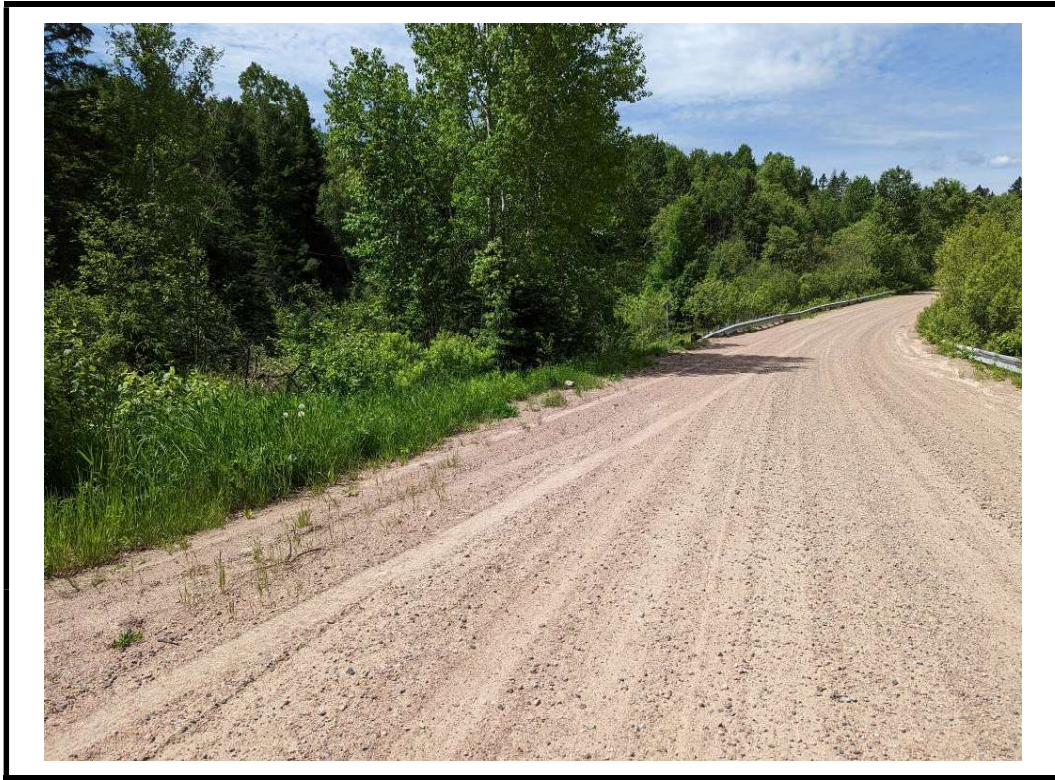


Photo 1 Structure from east approach

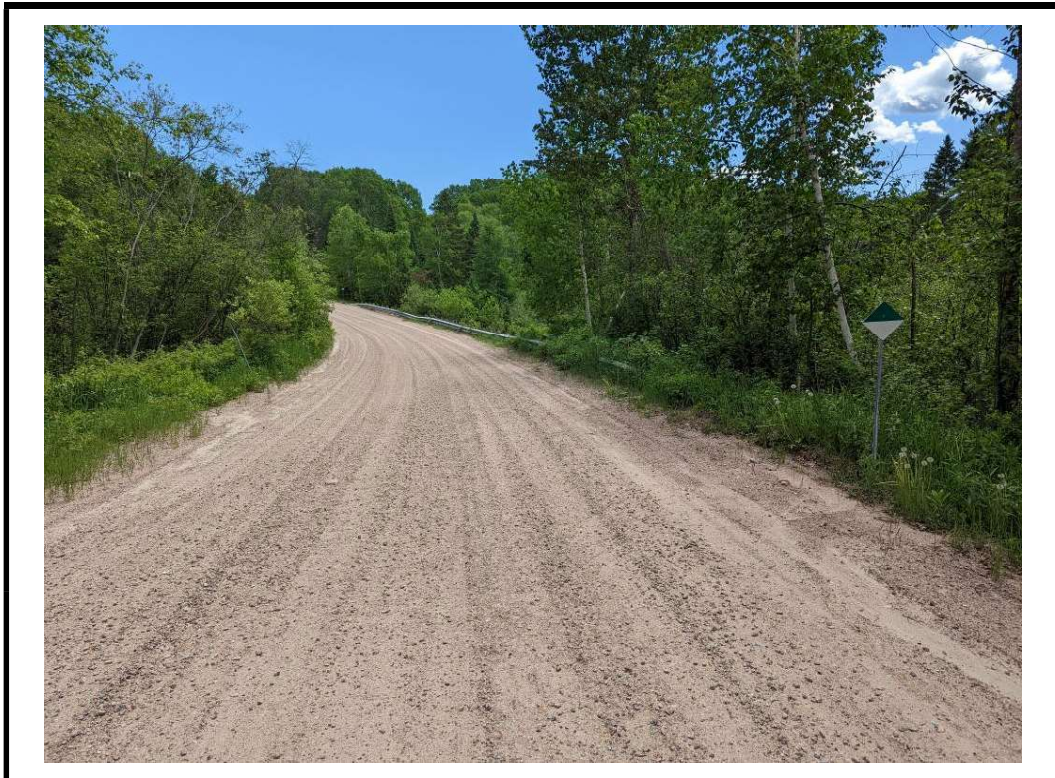


Photo 2 Structure from west approach



MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

SITE PHOTOGRAPHS

Site No.: 04

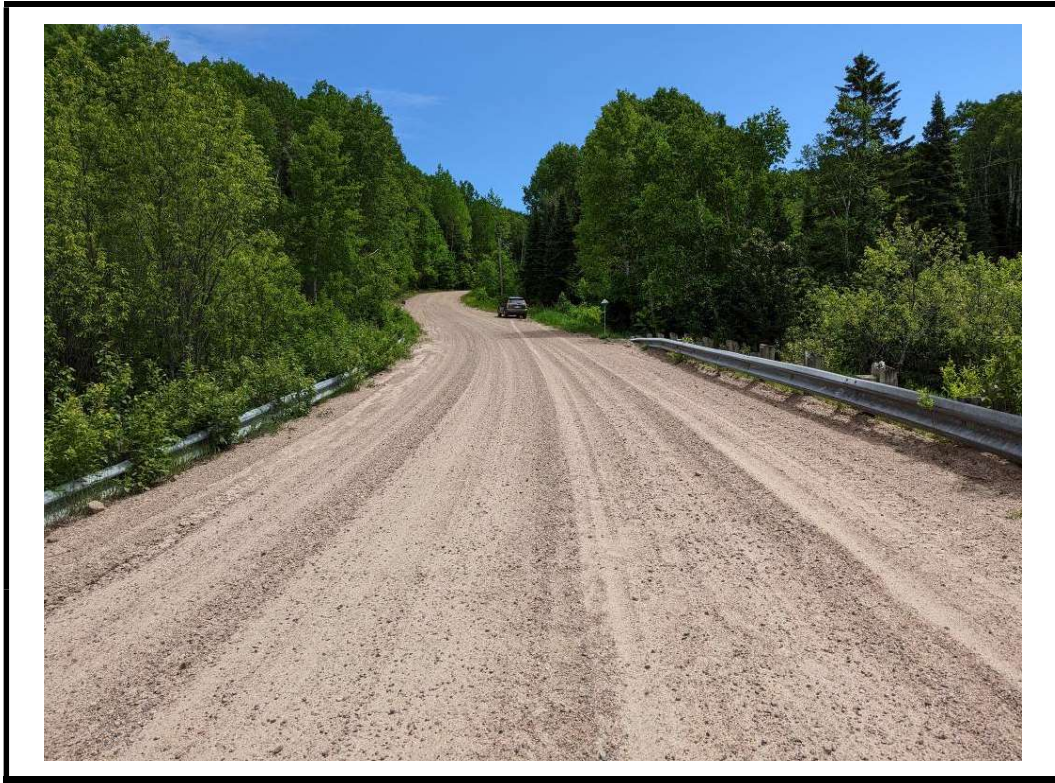


Photo 3 East approach from centre of structure

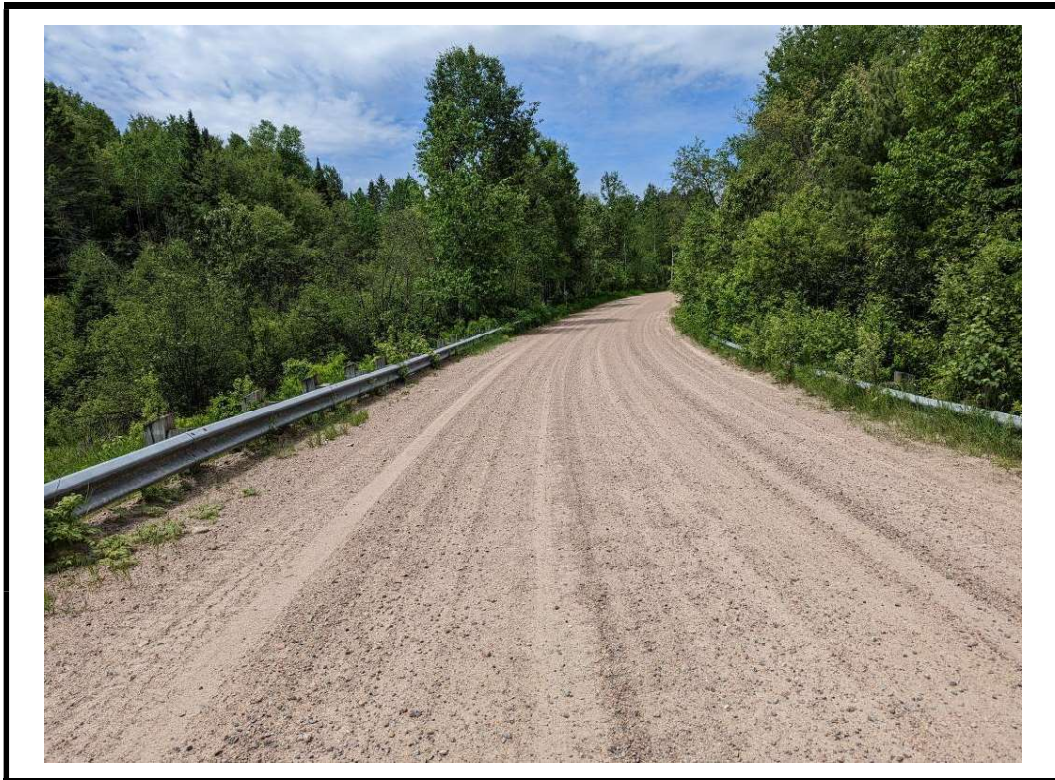


Photo 4 West approach from centre of structure

MUNICIPAL STRUCTURE INSPECTION FORM

CULVERT

SITE PHOTOGRAPHS

Site No.: 04



Photo 5 North elevation



Photo 6 South Elevation